



# Creating Professional Audio for Livestreaming



by Yamaha Pro Audio

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# Part One: Getting a Good Basic Music Mix for Streaming Platforms

## It's a Brave New World

The world of music performance has changed over this last year. We have all seen this happen in real time and that is also how we see the future; live! Live streaming looks to be an ever-increasing part of the professional audio world and it's about time we all got serious about getting a great mix for live streaming platforms.

## Know Your Audience

What platform are you streaming to?

What type of devices will your audience be viewing the performance?

What is the primary focus of the livestream?

These are some of the questions you need to ask yourself as you prepare to mix your livestream. By knowing the answers in advance, you are well positioned to do a professional job and create a great mix!

For example, if you are streaming over Zoom, you should ensure that the advanced audio settings have been set up for Original Sound with stereo hi-fidelity so that you can stream the highest quality over that platform. Will your audience be listening primarily on laptops, phones, home entertainment systems or a combination? You may want to set up a similar device that you can monitor through in order to hear what they hear. If the focus is singing and dialog, your first concern will be to get the vocals clear and at the forefront of your mix. This is why I advocate a top-down approach.

## Mix in Isolation

In an ideal situation, your mixing area should be in a separate room from the performance so that the acoustic sound in the room does not affect your balance in the mix. Your audience won't be in the same room and in fact could be on the other side of the world so make sure you are hearing the mix like the audience will.

Sometimes mixing in another space is not possible and so you must find another way to isolate yourself from the room sound. Using headphones is most likely the only way to do this and while this is not optimal, it can still work well so long as you are using headphones that block out as much external sound as possible. You should use a closed back headphone set such as the Yamaha HPH-MT8 pictured below to block as much room sound as possible.



YAMAHA Studio Monitor Headphones HPH-MT8

## Separate Monitor Volume

One thing to keep in mind is that the main mix output should not be used as a volume control for your monitoring setup, whether headphones or speakers. The master fader should only be used to set the level of the mix going into your streaming software. You will need a separate monitor volume control for your speakers or headphones. Most modern consoles have this feature built in, such as here on the Yamaha MGP32X.



YAMAHA MGP32X Phones/Monitor Section

## Mixing Top-Down

A typical sound check often starts with the engineer asking the drummer to hit the kick drum. Then we listen to the kick for a while, dialing mysterious parameters into the console so that the kick is perfect and then we move on to the snare and so forth. This is what I call a bottom-up approach and does have its benefits in certain situations.

But with livestreaming, the goal is not to fill up a stadium with tons of impactful low frequencies and coverage for thousands of people, but rather clarity and envelopment over personal devices for usually just a single person. So let's start with a top-down approach.

## Vocals First

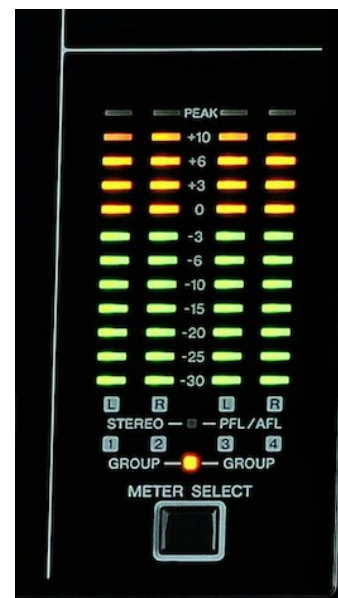
In this approach we start with the vocals. Get a good vocal level on the main singer or speaker by setting both the channel and main faders at 0 and adjust the preamp to get a good, healthy level on the master meter.

## What's a "Healthy" Level?

Now that's a good question! The answer depends on what type of mixer you are using; analog or digital. In the analog world, the meter for the main mix usually has a 0 point somewhere in the upper half of the range. In this image of the YAMAHA MGP32X analog mixer's Meter Section, you can see the main meter has a range of -30 to +10 with the 0 point about  $\frac{2}{3}$  of the way up.

When normal talking or singing reads around 0 on the meter, you can consider this healthy. For those of you used to working with the PFL bus, this level should be the same if both the channel and master faders are set to 0. This is the place to start.

On a digital console, the meter range is different but the



YAMAHA MGP32X Meter Section

principle is the same. In this image of the main meter on the TF5 digital mixer, the range is from -60 to 0 with a marking at the -20 point. This marking should be considered your healthy level point. Some consoles might use -18 but generally it's in this area, -18 to -20.

Now this level is only for normal singing or talking. Of course performers can get louder or softer and you need to check for this as well. Have the singer sing a very loud and/or high note and check to see that the level does not go all the way to the top where it will clip and cause distortion.



YAMAHA TF5 Meter Section

On the analog meter, this is "PEAK". On the digital meter, this is "OVER". Your mix should never reach this point on the meter. It can come close, but just not reach it at any point. We will talk more about how you can use mix bus processing to help prevent this and still have a great sounding mix for your livestream in another article. Just remember that the rule is not to let the mix level get to PEAK or OVER.

## Compressors

If you are familiar with compressors, now is a great time to use them. Put a compressor on the main vocal to control the level and even out the loud and soft passages so that it remains loud and clear as the focus of your mix. Plus, this will make it easier to bring in other musical elements without losing the vocal in the depth of your mix. With a strong vocal sound, it's easier to crank up the drums, bass, and other instruments to create a full mix that will be enjoyable to your audience.

## Drums Last

Now let's get the rest of the band in there. Don't worry about the drums until the end. They are almost always bleeding into every mic on stage and so you only want to add what's needed from the drum mics once you have a balance of everything else. Anyone who has experience mixing live sound knows this is true.

## **Minimize the Bleed**

We've all seen the plexiglass walls put up in front of the drums. While it's not aesthetically pleasing, it can really help you create a better mix for the livestream. Singers are often placed directly in front of the drums and of course the drum sound will go directly into the vocal mic causing a great deal of unwanted bleed.

## **Move the Drummer**

Try moving the drummer off to the side if you can. Plexiglass shields work well. Use an acoustically treated corner area for the drums, possibly with curtains to help contain the spill of cymbals and overly physical drummers. Gotta love 'em!

## **Turn the Amps**

Typical instrument amplifiers have a fairly narrow dispersion. Think of them like a laser, not a floodlight. They project sound in a very narrow beam. If that beam is pointed into another mic, especially a vocal mic, it can be a problem.

One solution is to turn the amps sideways so they project across the stage rather than forward into the vocal mics. Some amps have tilt-back features that project the sound up to the ceiling which can also help.

The other solution is to get the player to turn it down a bit. That always helps the mix so long as everyone is able to hear each other well in the monitor or in-ear systems.



## **Don't Forget the Room Mics**

I have a great deal of experience mixing live recordings, most notably Peter Frampton's 35th Anniversary World Tour box set and the reissue of Humble Pie's 'Performance Rockin' the Fillmore'. One thing Peter was always adamant about was the use of the room mics. I worked very hard to maximize the room sound of those concerts in order to provide a feeling of "being there" and envelopment for the listener. This is why you shouldn't forget the room mics!

There are a couple possibilities for room mic positioning that work well. You can use directional or cardioid mics on the stage pointing out into the audience or a pair of mics out in the room itself to capture the ambience. A good place to put them is out at the FOH position or in the back corners of a room.

Rather than using some digital reverb from a processor, try turning up the room mics for ambience and "liveliness". The real room sound is so much more believable than fake reverb and will help your audience feel like they are there with you. The room mics may require a good deal of EQ to blend well with the direct mics as each room has its own signature sound. Take advantage of this to make your mix more compelling!

## **This is not a Monitor Mix**

Remember that this mix should not be used as a monitor mix for the stage or performance area and should only go to the livestream. You do not need to worry about feedback at all in this case, so you can freely apply EQ, compression, de-essing, and FX without fear that it will cause feedback or interfere with the performers. This is much more like mixing in the studio than a live PA. Have fun with it!

# Part Two: What Mix Level to Use for Livestreaming

So you have your live performers mic'ed up and have a good sounding mix all ready to go for the livestream. But how do you know that the level you are mixing is optimal for the streaming platform of choice? In this article, I am going to show how best to set up your mix bus and streaming software to ensure that everyone across the world will hear your mix just the way you intended.

## Setup Streaming Software

First thing's first. You have to set up your streaming software to receive the mix you have created. Of course this step is best done long before the streaming session so that you are prepared when the live event starts. For this example, I am going to use OBS (Open Broadcaster Software) Studio, one of the most popular streaming applications out there.

## Audio Source

How are you connecting your mixer to the streaming computer? Analog? Digital? Network audio? This connection is critical since it is the master audio path for your mix into the streaming platform. Use the highest quality connection possible.

## Digital Connection

I prefer to use the Dante Virtual Soundcard software and route my mix into OBS via the digital network connection from Dante. However, an AES digital connection into an audio interface on the streaming computer will have the same quality. You will need to run a test tone to confirm this connection is working properly.

## Analog Connection

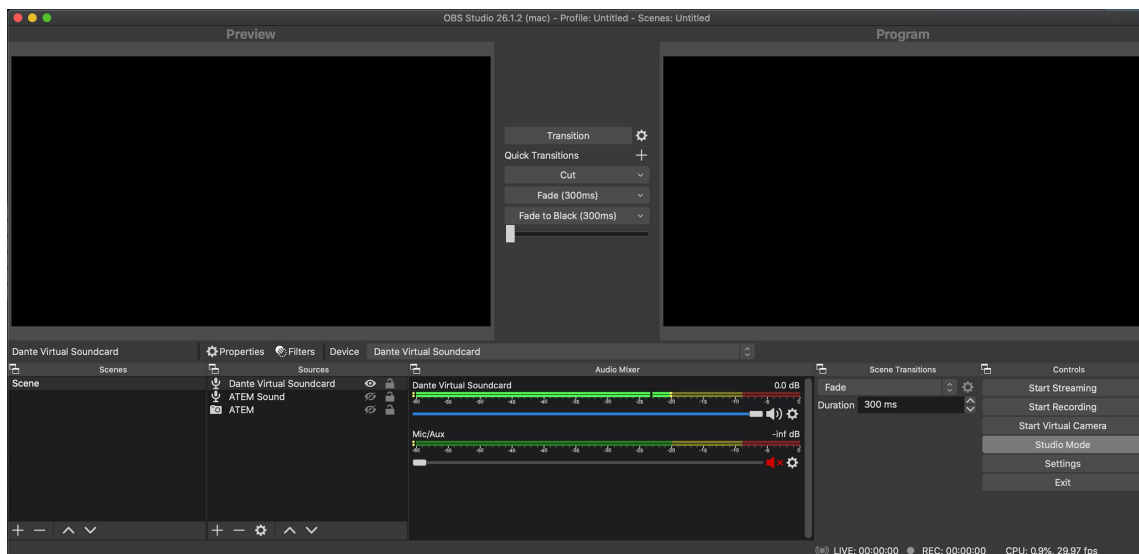
If you are limited to an analog connection, you will need to calibrate the input level to optimize the quality and headroom. Make sure you are using line level inputs on the streaming computer's audio interface and that you have some way to adjust the input trim to retain maximum headroom.

## Calibration with a 1kHz Tone

Setup a 1kHz test tone on your mixer. For analog mixers, you can find free phone apps that will generate a test tone from the headphone jack (if you still have one!). For the MG20 analog mixer, your test tone level should be set to '0' on the main meter. The MG20 is capable of outputting +20dB above the nominal (0 on the meter) so you want to match that headroom on the streaming software.

In OBS, the meters use a digital scale which uses all negative values, with 0dB being the maximum. This can be a bit confusing since we are sliding around the dB scales between analog and digital. Hopefully this will make it simpler. Since we need 20dB of headroom to match the MG20, the test tone level should read -20 in OBS.

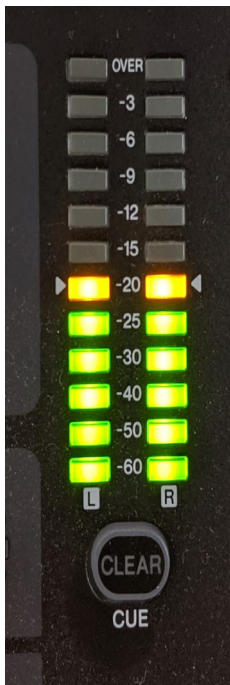
The MG20's master fader should be set to 0. Use the input line trims on the audio interface of the streaming computer to set the level in OBS to -20dB. Now you can be confident that the entire dynamic range of the mixer is being captured by the OBS software.



Open Broadcaster Software (OBS, Courtesy of OBS, LLC)

For a digital console, such as the TF3, the calibration process should be a bit easier and more intuitive. To start, the TF consoles have a built-in test generator where you can set the level precisely. You should not have to use any input trims to get a perfect test tone alignment into OBS when using a digital or network audio connection. If we connect the main mix output of the TF3 to the Dante Virtual Soundcard (DVS) input on the streaming computer, the calibration should be perfect. But we should check just to make sure.

Setup a test tone on the TF3 to register -20 on the main meter as shown below. Since the TF3 is using a digital scale, the hash mark on the meter is at -20 for the nominal mix level as you can see below.



TF3 main meter reading -20

Now in OBS, you should see the DVS 1-2 input reading a perfect -20dB on the meter. This means we have the same 20dB of headroom for the mix bus coming into OBS as we do in the TF3 mixer.

In both cases, the analog and digital mixers have 20dB of headroom and we have calibrated the input to OBS so that the test tone lines up at -20dB so we match the headroom in both systems. This is the ideal setup and now we can focus on the actual level of the mix you are creating!

## How Loud Is the Mix?

How do we measure loudness in mixing? Generally speaking, the difference between the average level and the maximum peak level of a mix determines how 'loud' it is. So if the average level of the mix is around -20dB, and the maximum peak level achieved in the mix is 0dB, there is a difference of 20dB between average and peak. If we start cranking up the average level of the mix higher and higher, but the maximum peak level stays at 0dB, we are effectively increasing the perceived loudness of the mix. There are various terms used for this relationship:

- Peak to average ratio
- Crest factor
- Headroom
- K-System

This is a critical factor in determining how your mix will translate over streaming platforms. If the peak to average ratio is too great, your mix will sound quiet and thin on laptops and phones. The mix is too 'quiet'. On the other hand, if the peak to average ratio is too little, the mix can sound over compressed, smashed, or distorted and even cause some platforms to "turn your mix down" automatically. In this case, your mix is too 'loud'. So what's a happy medium?

### 14dB Peak to Average

The 14dB peak to average ratio is the current best practice for livestreaming mix levels. This means your mix should average around -14dB on a digital scale, without peaking above 0dB. This is also known in the K-system as a K-14 calibration. OK, great, so how do we do that?

### A Note on Metering

A peak meter does not indicate average level, only the peak. An RMS meter represents the average level more accurately. You need to understand the meters that you are using in order to make good decisions on where your mix sits for the peak to average ratio. Watch the RMS meter for the average level and the peak meter for the peak levels. Some meters contain both types of indications.

Most live music with drums will naturally have a large peak to average level if no dynamic processing is applied. If you mic up all the instruments and put together a pleasing blend in

the mix, you will most likely have 20dB or more of peak to average level in your mix. In order to reduce the peak to average level, you will have to start applying dynamics processing in the form of compression and limiting.

## **Compression and Limiting**

While compression and limiting can be used to great effect on individual instruments, it can also be applied to the entire mix to help shape the overall peak to average levels. The basic approach is to do this in two stages. First, the compressor.

### **Mix Bus Compressor**

Insert a compressor on the mix bus. You are going to apply a certain amount of compression to help bring down the louder passages in the music and, in turn, bring up the softer passages. We want to do this gently in most cases so let's start with some basic settings:

- Ratio = 2:1
- Attack 50-75ms
- Release 150-250ms

These settings are relatively mild and should not induce any 'pumping' sounds from the compressor. Adjust the threshold to get 2-3dB of compression most of the time while not exceeding 5dB at the loudest parts. With a low ratio like this, we should be getting some smooth level control without any unwanted artifacts or pumping.

Now these are just general suggested settings and can vary wildly from situation to situation. It's a place to start and you can adjust to taste as you get used to how the compressor reacts to your mix.



TF3 Compressor plugin setup like this

## The Brickwall Limiter

Insert a limiter after the compressor on your mix bus. In a digital console, this should be placed post-fader if possible. If you only have access to an analog limiter, that's fine. Just place it last in the chain on your main mix or between the mixer's outputs and the inputs of the streaming computer.

The limiter is needed to prevent the levels from exceeding the desired maximum. With digital brickwall limiters, setting them is pretty straightforward. Set the output level to  $-0.5\text{dB}$  to give us just a tiny bit of safety. The threshold should remain at 0 or very close. Any signals that attempt to go higher than the threshold will be stopped in their tracks! And the maximum level the mix will achieve will be  $-0.5\text{dB}$ .

With the TF3 console, I'll use the master fader to set the output level to  $-0.5\text{dB}$  and use the compressor with an infinite ratio and hard knee to act as a brickwall limiter. Start with the fastest attack and release times and see how that sounds.



TF3 limiter with settings

With an analog limiter, settings can be a bit more involved. With a device such as the Portico II Master Buss Processor, you can set up the compressor and limiter in one device. The Portico limiter is one parameter, the threshold. Start with a setting of +24. Set your calibration 1kHz tone to the highest level possible without peaking on the main mix (+20 on the MG20 although the meter only has a light for +10 and Peak) and lower the limiter threshold until you just see the gain reduction light up.





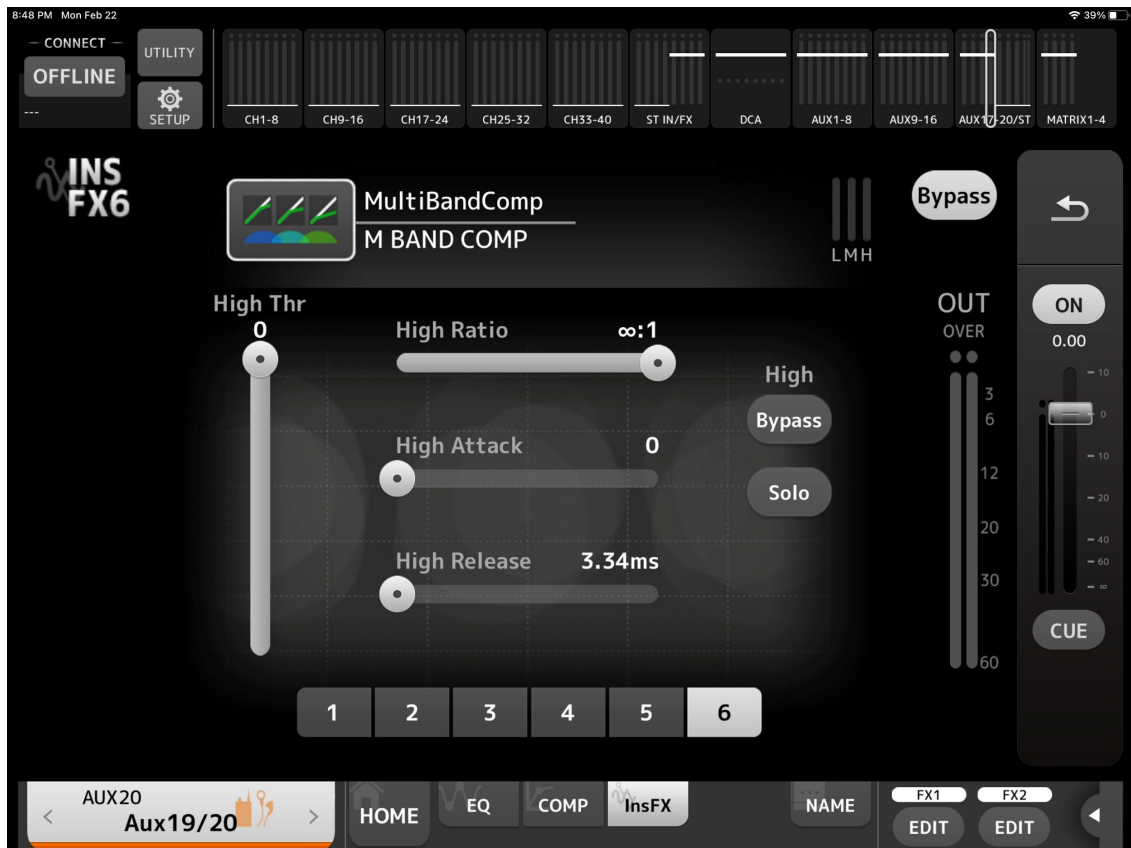
Rupert Neve Designs Portico II Master Buss Processor (Courtesy of Rupert Neve Designs, LLC)

## Balancing Peak to Average

Now we have control over the peak to average level of the mix. With 2-5 dB of compression, you can adjust the output gain of the compressor so that your average mix level is around -14dB RMS on the digital scale or +6 on the analog meter. At this point, if the limiter is doing nothing, that's OK. The limiter is just there as a safety, a backstop to prevent anything from going over the maximum. But probably the limiter is doing something.

The hope here is that your mix doesn't cause the limiter to work too hard or 'crush' your mix into oblivion. Look for gain reduction in the 2-3 dB range on quick peaks like the snare drum or kick drum, with occasional 5-6 dB reductions on the loudest peaks at most.

Some digital consoles, including the TF series, only have one dynamics processor on each output so you can't have a compressor AND a limiter together. The workaround is to use one of the stereo aux outputs as the mix bus for the livestream and add the insert FX MultiBandComp to act as a limiter. Link the thresholds and set the ratio to infinity and now you have a brickwall limiter after the compressor on the mix bus.



TF MultiBandComp set to STUN

## Test, Test, Test

With any live event, preparation is the key to success. You need to test your system with a complete practice run of everything. That way, you will know for sure how your mix will sound once it goes live. You can run a private livestream to see how your setup sounds when it is viewed on YouTube or other streaming platforms. And when you go live, try to have one person act as quality control by watching and listening to the livestream on another device to make sure everything is working well.

## **Caveat Emptor**

I am basing these suggestions on the general setting of a band with drums, bass, guitar, keyboards, and singers playing pop, country, rock, acoustic, or modern worship music in general. Dialog by itself will be quite different, let alone a flute quintet! The suggestions are a place to get started and not rigid rules. Experiment and see what sounds best to you over the various streaming platforms and as always, trust your ears before anything else. If it sounds good, it is good!

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Audioversity

by Yamaha Pro Audio